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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements relating to Dynamo-Electric Commutator Machines

We, THE ENGLISH ELECTRIC COMPANY LIMITED, of English Electric House, Strand, London, W.C.2., a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to commutator-type dynamo-electric machines.

According to the invention, a commutator-type dynamo-electric machine includes gas duct means for connection to gas-exhausting means for drawing gas by suction away from the vicinity of the commutator surface through the duct means, the said duct means including gas inlet means adjacent the commutator-engaging surface of each brush of the machine.

According to a preferred feature of the invention, the gas duct means are secured to the brush holders of the machine.

According to another preferred feature of the invention, the duct means include at least one gas-collecting duct, for connection to the gas-exhausting means, the gas inlet means comprising at least one slot in a wall of the duct or each duct.

According to a further preferred feature of the invention, the duct means are of electrically substantially non-conducting material.

According to another preferred feature of the invention, where the machine is for direct current operation the gas duct means comprise first duct means associated with the positive brushes and second duct means associated with the negative brushes, said first and second duct means being separate from each other.

A direct current motor in various preferred forms according to the invention will now be described by way of example and with reference to the diagrammatic drawings accompanying the Provisional Specification, in which:—

Fig. 1 is an end view of part of a commutator and brush-gear assembly in the motor;

Fig. 2 is a schematic plan view showing one arrangement in a four-pole motor;

Fig. 3 is an end view of part of an eight-pole motor showing another arrangement;

Fig. 4 shows an alternative form of duct to that shown in Fig. 1; and

Fig. 5 is a schematic plan view of a staggered brush set.

Referring to Figs. 1 and 2, the motor includes a commutator 10 having an outer cylindrical surface 11. The brushes 12 are held in brush holders 13, one only of which is shown in Fig. 1, supported by brush arms 14. The direction of rotation of the commutator is indicated by an arrow in the drawings. Attached to the trailing side 13*a* of the brush holder 13 is an air duct 15, made of an electrically non-conducting material such as asbestos cement. At the edge of the duct 15 nearest to the commutator-engaging end 12*a* of the brushes 12 is a longitudinal air inlet slot 16. One end 15*a* of the duct 15 is closed, an air outlet pipe being attached to the other end 15*b*. The air outlet pipes 17*a* are associated with the positive brushes and are connected together and to a fan 18, while the air outlet pipes 17*b* are associated with the negative brushes and are connected together and to another fan 19, both fans exhausting to atmosphere.

When the motor is operating, air in the vicinity of the commutator surface becomes ionised. The fans 18 and 19 draw this ionised air away through the slots 16, the ducts 15 and pipes 17 to atmosphere, at the same time removing wear products from the brushes and the commutator surface and providing a means of cooling the commutator and brushes. The ionised air is replaced by fresh air entering the machine in the usual way.

Separate outlet pipes 17*a* and 17*b* and fans 18 and 19, for the positive and negative brushes respectively, are provided in the sys-

tem shown in Fig. 2 because otherwise under fault conditions the pipes 17*a* and 17*b* may be filled with ionised gas which would tend to short-circuit the brush arms. The use of two sets of pipes and fans may be avoided by the arrangement shown in Fig. 3.

Referring now to Fig. 3, the commutator 10 is shown mounted on the rotor shaft 30. The ducts 15 have outlet pipes 31, each of which leads through a suitable de-ionising device 32 to a common header 33, which is exhausted to atmosphere through a pipe 34 by a single fan (not shown).

Fig. 4 shows another form of duct system, generally indicated at 40, in which fresh air is forced into the machine through the duct 41, ionised air being removed as before through the slots 16 and duct 15.

It is common practice in the art to stagger some brushes circumferentially from others in the same brush arm, in order to reduce the possibility of longitudinal grooves appearing on the commutator after prolonged use. One common way of achieving this is to separate some of the brush-holders from the brush arm by means of a stagger plate which serves as a spacer. If staggered brushes are used, one arrangement of duct 15 is as shown in Fig. 5, in which the duct 15 is secured to brush holders 50 which in turn are connected through a stagger plate 51 to the brush arm 14. The non-staggered brush holders 52 are separated from the duct 15 by a packing piece 53.

The fans 18 and 19 are preferably arranged to discharge outside the room where the motor is situated. They may be fitted with filters to extract the wear products and other particles from the ionised air. It should be noted that the invention can be applied to both d.c. and a.c. commutator machines; it may also be applied in any machine where the brushes are set at an angle to the commutator. Such machines are well-known in the art, the purpose of the angle being to increase the commutator-engaging surface of the brushes and so to reduce arcing and improve contact. The ducts 15 and 41 may be of any suitable cross-section, and made of any suitable material. The invention may also be applied to machines in which the commutator operates in an atmosphere of a gas other than air.

WHAT WE CLAIM IS:—

1. A commutator-type dynamo-electric machine including gas duct means for connection to gas-exhausting means for drawing gas by suction away from the vicinity of the commutator surface through the duct means, the said duct means including gas inlet means adjacent the commutator-engaging surface of each brush of the machine.

2. A commutator-type dynamo-electric machine according to Claim 1, wherein the gas duct means are secured to the brush holders of the machine.

3. A commutator-type dynamo-electric machine according to Claim 2, wherein the duct means are secured to the trailing side of the brush holders.

4. A commutator-type dynamo-electric machine according to any preceding claim, wherein the duct means include at least one gas-collecting duct, for connection to the gas-exhausting means, the gas inlet means comprising at least one slot in a wall of the duct or each duct.

5. A commutator-type dynamo-electric machine according to Claim 4, wherein the duct means include a gas duct adjacent each gas-collecting duct, having gas outlet means adjacent the surface of the commutator and being arranged for connection to gas supply means whereby to supply fresh gas to the commutator surface for replacing gas removed therefrom through the gas-collecting duct.

6. A commutator-type dynamo-electric machine according to any preceding claim for direct current operation, wherein the gas duct means comprise first duct means associated with the positive brushes and second duct means associated with the negative brushes, said first and second duct means being separate from each other.

7. A commutator-type dynamo-electric machine according to Claim 6, wherein said first duct means associated with the positive brushes are arranged for connection to one gas-exhausting means and said second duct means associated with the negative brushes are arranged for connection to another gas-exhausting means.

8. A commutator-type dynamo-electric machine according to any of Claims 1 to 5 for direct-current operation, wherein the gas duct means comprise first duct means associated with the positive brushes and second duct means associated with the negative brushes, said first and second duct means being connected to a common gas-exhausting means through first and second de-ionising means respectively.

9. A commutator-type dynamo-electric machine according to Claim 2 and any of Claims 3 to 8 wherein the duct means include ducts of electrically substantially non-conducting material secured to the brush holders of the machine.

10. A commutator-type dynamo-electric machine substantially as herein described with reference to the drawings accompanying the Provisional Specification.

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Chartered Patent Agent.

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1005433 PROVISIONAL SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

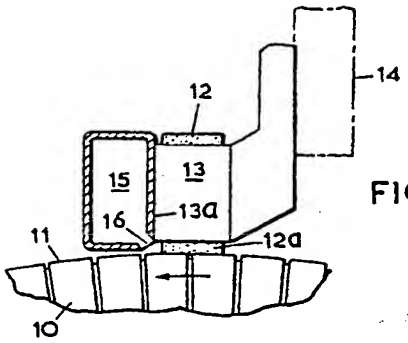

FIG. 1

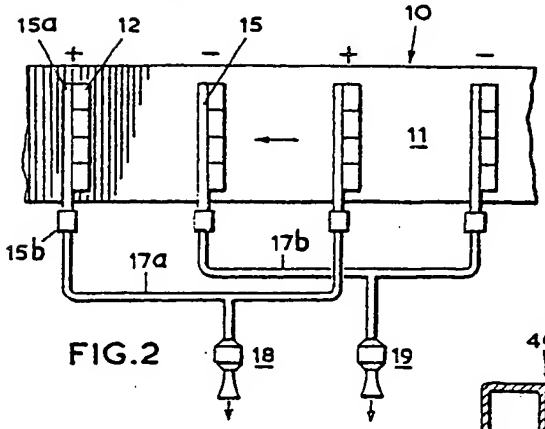

FIG.2

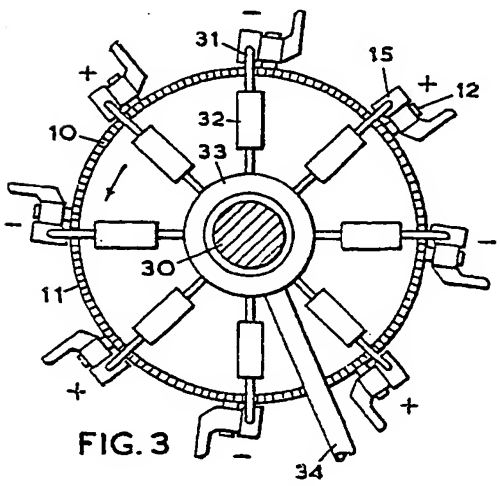

FIG. 3

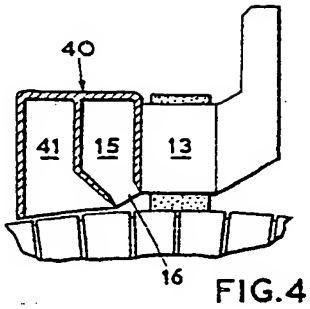

FIG.4

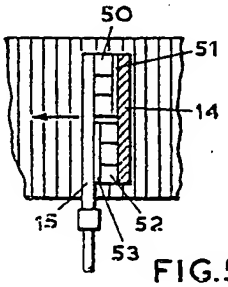

FIG.5